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**WEATHER IN THE INDIAN OCEAN TO LATITUDE 30°S AND LONGITUDE 95°E  
including  
THE RED SEA AND PERSIAN GULF**

Part 2

**The Gulf of Aden and West Arabian Sea to Longitude 60°E**

APPROVED FOR PUBLIC RELEASE - Per Mike  
Howgill, Meteorology & Oceanography Center, UK (24  
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## Marybeth Dowdell (Head Research Rpts)

---

**From:** Brand, Mr. Sam [samuel.brand@nrlmry.navy.mil]  
**Sent:** Wednesday, January 24, 2007 11:47 AM  
**To:** Marybethd@library.nrl.navy.mil  
**Subject:** FW: FNMOC Request

Marybeth, below is approval from the Meteorological Office in England.  
Please pass to your folks....Sam

-----Original Message-----

**From:** Howgill, Michael [mailto:michael.howgill@metoffice.gov.uk]  
**Sent:** Wednesday, January 24, 2007 12:36 AM  
**To:** Brand, Mr. Sam  
**Cc:** martin.densham.uk@navy.mil; Molloy, Sally  
**Subject:** RE: FNMOC Request

Sam

Yes, you have approval to put those publications referred to below onto the web.

Regards

Mike

Mike Howgill  
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-----Original Message-----

**From:** Brand, Mr. Sam [mailto:samuel.brand@nrlmry.navy.mil]  
**Sent:** 22 January 2007 18:30  
**To:** Howgill, Michael  
**Cc:** martin.densham.uk@navy.mil  
**Subject:** FW: FNMOC Request

Michael, my name is Sam Brand and I have been working with Martin on this approval. I just wanted to clarify that we are planning to place the publications referenced below (Weather in the Indian Ocean to Latitude 30 and Longitude 95 including the Red Sea and Persian Gulf ) on the web and thus the publication would be available to all including DoD. Do we have your approval for that?

Sam Brand

-----Original Message-----

**From:** Densham, Martin P FORNATL-UK LT 63134  
[mailto:martin.densham.uk@navy.mil]  
**Sent:** Monday, January 22, 2007 8:50 AM  
**To:** Brand, Mr. Sam  
**Subject:** FW: FNMOC Request

Approved - see below.

Martin

-----Original Message-----

**From:** Howgill, Michael [mailto:michael.howgill@metoffice.gov.uk]

Sent: Monday, January 22, 2007 3:11  
To: Densham, Martin P FORNATL-UK LT 63134; Ward, John F (DS)  
Cc: Murphy, Dominic; Molloy, Sally  
Subject: RE: FNMOC Request

Martin

Sorry for the delay in replying.

This request has now been through the licensing and IP staff and they are content that FNMOC put the Environmental Prediction Research Facility Technical Bulletins referred to below on the FNMOC DoD website. This e-mail acts as confirmation of that approval.

Any further enquiries please let me know.

Regards

Mike  
Mike Howgill  
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---

From: Ward, John F (DS)  
Sent: 15 January 2007 16:00  
To: Murphy, Dominic  
Cc: Howgill, Michael  
Subject: FW: FNMOC Request

Dominic,

Could you advise on how to proceed with this enquiry regarding copyright permission?

Regards,  
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From: Densham, Martin P FORNATL-UK LT 63134  
[mailto:martin.densham.uk@navy.mil]  
Sent: 09 January 2007 17:28  
To: Ward, John F (DS)  
Subject: FNMOC Request

Hi John,  
I've had a request from the port studies department here at FNMOC to ask the UKMO for permission to scan and publish some old weather publications that were written by the Met Office for the USN back in 1940-44. The documents, called Naval Environmental Prediction Research Facility Technical Bulletins, were re-printed in 1980 and give climatology for various areas around the world in hard copy format. They'd like to scan them and make them available via the FNMOC DoD website. NRL Washington who own that department asked that they get an email confirmation from UKMO to approve the move. I'll try and speak to you tomorrow to arrange this.

Regards - Martin  
Lt Cdr M P J Densham RN

UKPEP/Fleet Liaison Supervisor, Warfighting Directorate Fleet Numerical  
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## INTRODUCTION

With the increased tempo of U.S. Navy operations in the Indian Ocean, there has been a matching increase in concern over the environmental support available to the Fleet meteorologists. As part of the NAVENVPREDRSCHFAC effort to improve that support, this Command has reprinted a series of meteorological handbooks -- collectively titled Weather In The Indian Ocean -- that were originally issued by the British Government in the 1940-44 time frame.

These handbooks, published as three volumes in a total of twelve parts, were prepared by the Meteorological Office, Air Ministry, in cooperation with the Naval Meteorological Branch, Admiralty, London. Titles of all volumes/parts in the series are given below.

Because the series has long been out of print, the NAVENVPREDRSCHFAC has obtained permission to reprint and distribute the handbooks to U.S. Navy units. As in the original publication, this new reprinting ultimately will comprise twelve individual books, each marked with volume and part number; the reprint set is distributed as NAVENVPREDRSCHFAC Technical Bulletin 80-02, April 1980. The books are three-hole-punched for collection into ring binders. There has been no editing or changing of the original material.

Users of the series should be alert to the fact that a number of place names used in the original writing have changed over the intervening years.

### Volumes/parts titles in the series are as follows:

- Vol. I ---- Weather In The Indian Ocean - General Information (in one part)
- Vol. II --- Weather In The Indian Ocean to Latitude 30<sup>0</sup>S and Longitude 95<sup>0</sup>E including the Red Sea and Persian Gulf (in nine parts; see parts titles below)
- Vol. III -- Weather In The Indian Ocean - Aids To Forecasting (in two parts:  
1, Indian Ocean; and 2, North Indian Ocean)

### Parts titles, Volume II (local information):

1. Red Sea
2. The Gulf of Aden and West Arabian Sea to Longitude 00<sup>0</sup>E
3. The Persian Gulf and Gulf of Oman
4. The Makran Coast from Gwadar to Karachi and the West Coast of India to Latitude 20<sup>0</sup>N
5. West Coast of India from Latitude 20<sup>0</sup>N to Cape Comorin, with an Appendix on Conditions at Bombay
6. A. East Coast of India from Cape Comorin to the Ganges Delta -- B. Ceylon
7. The Coast of Burma
8. The South Indian Ocean to Latitude 30<sup>0</sup>S.
9. Coast of East Africa from the Equator to Cape Delgado



## CONTENTS

	<i>Page</i>
I. GENERAL	
1. Introduction .. .. .	7
2. Regional summaries .. .. .	8
Gulf of Aden .. .. .	8
Western Arabian sea .. .. .	10
Italian Somaliland .. .. .	11
II. PRESSURE .. .. .	12
Annual variation .. .. .	13
Diurnal variation .. .. .	14
III. TROPICAL CYCLONES .. .. .	15
IV. WIND	
1. Surface winds .. .. .	16
Annual and diurnal variation .. .. .	17
Wind speed over the sea .. .. .	57
Gales .. .. .	58
Local winds .. .. .	59
2. Upper winds .. .. .	61
General .. .. .	74
Annual and diurnal variation .. .. .	74
Upper winds at Aden .. .. .	78
V. VISIBILITY .. .. .	79
Annual variation .. .. .	80
VI. CLOUD .. .. .	86
Annual and diurnal variation .. .. .	88
VII. RAIN AND HAIL	
1. Rain .. .. .	95
Annual rainfall .. .. .	96
Annual variation .. .. .	98
Extremes of monthly and annual rainfall .. .. .	101
Maximum rainfall in 24 hours .. .. .	101
2. Hail .. .. .	102
VIII. TEMPERATURE	
1. Surface air temperature .. .. .	102
Annual variation .. .. .	103
2. Upper air temperature .. .. .	107
3. Sea temperature .. .. .	107
Annual variation .. .. .	107
Diurnal variation .. .. .	110
4. Relative values of sea and air temperature .. .. .	111
IX. HUMIDITY .. .. .	111
Relative humidity .. .. .	111
Absolute humidity .. .. .	113
Wet-bulb temperature .. .. .	115
X. MISCELLANEOUS	
1. Thunderstorms .. .. .	116
Annual variation .. .. .	116
2. Duststorms and sandstorms .. .. .	117
3. Sand-devils, whirlwinds and waterspouts .. .. .	119
4. Sea and swell .. .. .	119
5. Refraction .. .. .	121
6. Phosphorescence .. .. .	121
E. GEOGRAPHY .. .. .	178

## LIST OF ILLUSTRATIONS

<i>Fig.</i>		<i>Page</i>
1.	The Gulf of Aden and west Arabian sea .. .. .	2
2a-13a.	Surface winds and temperature of the sea surface—monthly .. .. .	18-40
2b-13b.	Surface winds at coastal stations—monthly .. .. .	19-41
14.	Diurnal variation of wind at Aden and Berbera during the NE. monsoon .. .. .	44
15.	Anemogram showing the diurnal variation of wind at Berbera on a typical day during the NE. monsoon, December 16-17, 1931 .. .. .	facing 44
16.	Anemogram showing the diurnal variation of wind at Berbera on a typical day during the SW. monsoon, July 20-21, 1931 .. .. .	facing 45
17.	Diurnal variation of wind at Berbera in May .. .. .	48
18.	Diurnal variation of wind speed over the sea in July in latitude 12-13° N. .. .. .	50
19.	Diurnal variation of wind at Aden and Berbera during the SW. monsoon .. .. .	53
20.	Diurnal variation of wind at Berbera in September .. .. .	54
21.	Annual variation of wind speed over the sea .. .. .	57
22.	Upper winds—seasonal—Salalah .. .. .	62
23.	Upper winds—seasonal—Riyan .. .. .	63
24.	Upper winds—seasonal—Aden .. .. .	64
25.	Upper winds—seasonal—Perim .. .. .	65
26.	Upper winds—seasonal—Berbera .. .. .	66
27-8.	Upper winds—December-February, March-May—Socotra and Bander Kassim .. .. .	67
29-32.	Upper winds—monthly—Cape Guardafui .. .. .	68-71
33.	Diurnal variation of upper wind—Aden, March-May .. .. .	72
34.	Diurnal variation of upper wind at Berbera during the NE. and SW. monsoon .. .. .	73
35.	Annual variation of the frequency of visibility less than 5 miles .. .. .	81
36.	Frequency of mist and haze in the western Arabian sea, June-August .. .. .	83
37.	Percentage frequency of mist and haze off Cape Guardafui, July-August .. .. .	84
38.	Annual variation of mean cloud amount .. .. .	87
39.	Diurnal variation of cloud amount at Aden .. .. .	88
40.	Annual variation of rainfall .. .. .	96
41.	Annual variation in the frequency of rain days .. .. .	97



## LIST OF APPENDED TABLES

<i>Table</i>	<i>Page</i>
I. General climatological tables	
Ras al Hadd .. .. .	123
Masira island .. .. .	124
Socotra .. .. .	125
Salalah .. .. .	126
Riyan .. .. .	127
Aden .. .. .	128
Perim .. .. .	129
Jibuti .. .. .	130
Berbera .. .. .	131
Bander Kassim .. .. .	132
Cape Guardafui .. .. .	133
Mogadiscio .. .. .	134
Gumbo .. .. .	135
II. Monthly frequency of wind direction and force at sea	
Bab el Mandeb, Gulf of Aden .. .. .	136
15-20° N., 50-60° E. .. .. .	137
10-15° N., 50-60° E. .. .. .	138
5-10° N., 50-60° E. .. .. .	139
0-5° N., 45-55° E. .. .. .	140
0-5° N., 55-60° E. .. .. .	141
III. Monthly frequency of wind direction and force	
Berbera .. .. .	142
IV. Monthly frequency of wind direction at coastal stations in the early morning	
Ras al Hadd, Masira island, Socotra, Salalah .. .. .	143
Riyan, Aden, Perim, Bander Kassim .. .. .	144
V. Monthly frequency of winds of different forces at coastal stations	
Ras al Hadd, Masira island .. .. .	145
Socotra, Salalah .. .. .	146
Riyan, Aden .. .. .	147
Perim, Bander Kassim .. .. .	148
VI. Monthly and hourly speed and direction of the resultant wind	
Berbera .. .. .	149
VII. Seasonal frequency of wind direction and speed in the upper air	
Masira island .. .. .	150
Socotra .. .. .	151
Salalah .. .. .	152
Riyan .. .. .	153
Aden .. .. .	154
Perim .. .. .	155
Berbera .. .. .	156
Bander Kassim .. .. .	157
VIII. Monthly frequency of wind direction and speed in the upper air	
Cape Guardafui .. .. .	158-160
IX. Diurnal variation of wind direction and speed in the upper air	
Aden .. .. .	161
Berbera .. .. .	162-3
Riyan .. .. .	164
Bander Kassim .. .. .	165

## LIST OF APPENDED TABLES--continued

<i>Table</i>	<i>Page</i>
X. Visibility over the sea	
Gulf of Aden and Arabian sea, 10-15° N... .. .	166
XI. Visibility at coastal stations	
Ras al Hadd .. .. .	166
Masira island, Socotra .. .. .	167
Salalah, Riyan .. .. .	168
Aden, Perim .. .. .	169
Berbera, Bander Kassim .. .. .	170
XII. Monthly frequency of different amounts of cloud over the sea	171
XIII. Monthly frequency of different amounts of cloud at coastal stations	
Ras al Hadd .. .. .	171
Masira island, Socotra .. .. .	172
Salalah, Riyan .. .. .	173
Aden, Perim .. .. .	174
Berbera, Bander Kassim .. .. .	175
XIV. Swell .. .. .	176
XV. Monthly frequency of different states of the sea	
Socotra, Aden .. .. .	177

# THE GULF OF ADEN AND WEST ARABIAN SEA TO LONGITUDE 60° E.

INCLUDING

THE COASTS OF THE SOMALILANDS, HADHRAMAUT AND OMAN

## I—GENERAL

### 1.—INTRODUCTION

The area under consideration stretches from the equator to 22° N., and from 43–60° E., and includes the coastal regions of south-east Arabia and the Somalilands.

The Gulf of Aden runs from west-south-west to east-north-east, and is connected in the west with the Red sea by Bab el Mandeb. It lies between the parallels of 10° and 15° N. and the meridians of 43° and 52° E. It is approximately 480 nautical miles in length and its width varies from 13 miles at Bab el Mandeb to about 174 nautical miles at Cape Guardafui (Ras Asir). The Gulf is deep outside the 100-fathom line; there is a depth of 2,347 fathoms about 75 miles south of Ras Fartak (*c* 52° E.), and one of 1,820 fathoms about 83 miles south of Ras al Kalb (*c* 49° E.). West of the latter the depths gradually shoal, and within the Gulf there are no deep soundings south of 12° 15' N. Off the east coast of Italian Somaliland the sea is deep, soundings reaching more than 2,000 fathoms within 200 miles of the coast.

The Gulf is bounded on the north by the mountains of Yemen and Hadhramaut, which are over 6,000 feet high, with peaks rising to 10,000 feet; on the south it is limited by the mountains of the Somalilands, terminating in Cape Guardafui, to the east of which is the island of Socotra.

The Arabian plateau slopes gradually north-eastward until it fades into the coastal plain bordering the Persian gulf. The eastern lowlands are broken only by the mountains of Oman (10,000 feet) in the extreme east. The Khorya Morya islands lie off the coast in longitude 56° E., and Masira island is to the east of the gulf of that name.

At the head of the Gulf in French Somaliland the coastal plain is fairly wide; a valley lying parallel with the coast is separated from it by a ridge. Behind this is the Abyssinian plateau, 6,000–9,000 feet above sea level, with isolated peaks rising to 15,000 feet. In British Somaliland the coastal plain becomes narrower to the east, where it is backed by a precipitous escarpment. The interior plateau, which attains a height of 7,000 feet in the north, slopes south-eastward to the broad coastal plain of Italian Somaliland.

Several rivers enter the Arabian sea along this coast, the most notable being the Juba; the Webbe Shebeli follows the north-east to south-west trend of the coast for some 200 miles and then disappears in a swampy depression before entering the Juba estuary.

Aden is the only important harbour on the north side of the Gulf; farther north-east along the Arabian coast, Masira channel within Masira island affords sheltered anchorage for vessels of moderate draught but the channel is somewhat intricate. Obok, Jibuti, Zeila and Berbera are the only ports on the west and south sides of the Gulf. On the east African coast Kisimayu (Chisimaio) just south of the equator and Baia Sud di Hafun in about 10° N. (during the N.E. monsoon season) are the only anchorages which can be considered as harbours for large vessels; the other ports are only open anchorages, and of these the principal ones are Brava, Merca, Mogadiscio, Itala and Obbia.

The year has been divided into the following four seasons:—

- (i) N.E. monsoon, December to March.
- (ii) Transition season, April and May.
- (iii) S.W. monsoon, June to September.
- (iv) Transition season, October and November.

### 2.—REGIONAL SUMMARIES

#### Gulf of Aden

The climate of the Gulf of Aden is exceptionally dry and, especially from May to September, very hot. Average temperatures over the sea range from about 77° F. in January to 87° or 88° F. in June. Even during the cool season from November to March temperatures exceeding 90° F. have been recorded at coastal stations on both sides of the Gulf, while in June, July and August on the African coast the shade temperature regularly exceeds 100° and in some parts even 105° F. during the heat of the day, and at Berbera has been known to rise to 116° F. in all three months.

In spite of the intense heat neither British Somaliland nor the Aden Protectorate is unhealthy for white people, though the climate, especially on the low-lying coastal plain, is very trying in the S.W. monsoon season, partly on account of the presence of vast quantities of sand in the air. On the coast itself the atmosphere is moist and steamy; wet-bulb temperatures, especially during the day, are high and in spite of the low relative humidity the air is very oppressive. A few miles inland both relative and absolute humidities are low. The high plateau and hill country of the Aden Protectorate has a temperate and healthy climate; the extreme range of temperature is from about 40° to 102° F. so that there is no real cold and no very severe heat. The diurnal range is often as much as 30° F. or more. On the higher mountains frost often occurs.

Over the Gulf and on the coasts the rainfall is remarkably small, only 50–100 mm. (2–4 in.) on the average, and over limited areas a whole year has been known to pass without any rain at all. The average annual fall on the plateau is about 18 in. but it is heavier on the mountains. On the coasts the only rainfall is a few showers chiefly in the early part of the year; on rare occasions these may be fairly heavy, but on the great majority they are not likely to affect the ground for landing purposes.

On the plateau the rainfall is precarious and usually falls between April and November in violent local thunderstorms, occasionally accompanied by hail.

Normally there is very little cloud. At no time of the year does the average exceed 5 tenths of the sky covered and in most months it is less than 4 tenths.

Visibility is generally good from about October to May but during the SW. monsoon the atmosphere is usually thick and hazy. Glare from the mountains and desert is very trying to the eyes during daylight hours. Twilight is short, seldom more than 20 minutes, and during that time the light is deceptive.

The winds and weather in the Gulf are controlled to a great extent by seasonal changes of pressure distribution, for the Gulf lies well to the southward of the normal tracks of extratropical depressions and thus any effect that these may have on the weather is indirect. From about mid October to mid May E. and NE. winds blow steadily, usually of force 2 or 3 but strengthening slightly in January; they sometimes freshen but only rarely reach gale force; in Bab el Mandeb they are stronger than elsewhere, being about force 4. At the close of the season winds become light and variable; in May, and sometimes in April near the eastern entrance to the Gulf, southerly winds increase in frequency, and from June to September S. and SW. winds prevail. At the eastern entrance they blow strongly with force 4-5 and may reach gale force about four times a month, but their strength falls off towards the west. Except at the western end the average speed of the wind is as great as in the NE. monsoon and in the coastal regions and over the Gulf itself between 46° and 48° E. it is appreciably greater, but its direction is not so steady as in that season. Coastal winds during the SW. monsoon show some remarkable features and frequently reach gale force in the morning near Berbera.

Tropical cyclones very seldom enter the Gulf though three such storms have been known to do so in the past 60 years. Violent squalls and oppressively hot storms from the land are liable to occur on the coasts during the late afternoon and evening during the hot season and may continue into the night. They are usually accompanied by sand, which may drift out over the Gulf. The conditions giving rise to them are not yet understood.

Flying conditions are said to be very bumpy up to at least 6,000 feet over the coastal plain and low-lying valleys and also near the coastal mountains; but conditions are much better over the plateau. The high temperature and resulting low density affects the rate of climb; with heavily laden machines, flying near the ground becomes dangerous except at high speeds and landings have to be made faster than normally.

The following notes supplied by the Meteorological Officer at Aden describe a typical day's weather there in different seasons.

**Local notes on the weather at Aden.**—*NE. monsoon* (about October to April).—Following clear nights with a light N. or NE. wind, small amounts of cloud are frequently seen forming just before dawn. These may thicken a little after sunrise, but soon begin to disperse and by noon the sky is usually cloudless and remains so for the rest of the day. The wind freshens from NE. or E. during the forenoon and as often as not veers to

SE. during the afternoon. Visibility is generally above 20 miles. The air is comparatively cool and pleasant, temperature usually ranging from about 73° to 80° or 85° F. during the 24 hours.

*SW. monsoon* (about June to August).—Wind is light and may blow from either a southerly or a northerly point in the early morning, freshening from SE. or S. two or three hours after sunrise and blowing from this direction until an hour or so before sunset. The sky is cloudless but, owing to the haze, usually has a milky appearance. Visibility is poor, often only 3 or 4 miles. A wind off the land sets in an hour or so before sunset and may blow in rather uncertain fashion until about midnight, after which it is as often as not superseded temporarily by a southerly wind. Temperature is high, ranging on the average from about 83° to 93° F.

*Transition periods* (May and September).—Nights are usually clear and calm with sometimes a land breeze blowing intermittently. Wind freshens from SE. during the late forenoon and sky is still cloudless except for patches of high cloud which often spread over from north-west towards sunset and disperse later in the evening. Visibility is generally good although less consistently so than during the NE. monsoon. Temperature is high and the atmosphere feels damp and oppressive.

#### Western Arabian sea

The weather in the Arabian sea is on the whole slightly cooler than that in the Gulf of Aden, but even so it is hot throughout the year. Average temperatures range from 75° F. in January, the coolest month, to about 84° F. in May, the hottest. The arrival of the SW. monsoon brings an appreciable fall of temperature and August is 5-8° F. cooler than May. There is a slight rise again by October amounting in most parts to about 2° F.

There is very little rain in the north-west but in the extreme south-east near the equator the estimated amount exceeds 1,000 mm. (25 in.). During the cooler season the weather is fine with clear blue skies and fairly low humidity so that the air feels very fresh. The arrival of the SW. monsoon in May or June is accompanied by unsettled weather with cloud and squalls, and this continues until September. In the transition period before the onset of the NE. monsoon the periods of bad weather are shorter and alternate with longer periods of fine clear weather. On the Arabian coast the amount of rain is small and is mostly in the form of drizzle. It is seldom sufficient to make the ground soft or muddy except during the rare occurrence of a tropical cyclone.

Over the open sea skies are comparatively clear throughout the year. Except in the extreme south in no season does the average exceed 5 tenths. During the SW. monsoon the cloud base over the open sea is often as low as 3,000 feet but rarely below 1,000 feet. Information about visibility is scanty but it appears to be good throughout the year except when it is reduced by cloud and rain during the SW. monsoon. Near the coast conditions during the SW. monsoon are worse than over the open sea, and from about mid June until the end of September the weather in the neighbourhood of Salalah on the Arabian coast is exceptionally bad, the sky is almost continuously overcast with low stratus cloud, and intermittent slight drizzle (see p. 92). Near Socotra and off the African

coast, especially to the south of Cape Guardafui, there is a good deal of coastal fog and haze during the SW. monsoon. During the NE. monsoon flying conditions are likely to be extremely good with very little low cloud and excellent visibility apart from occasional duststorms on the coast.

During the cool season NE. winds blow strongly, force 3-4, accompanied by slight or moderate swell. In April winds become light and variable, blowing from SW. near the Arabian coast; they strengthen in May when they blow chiefly from SW. or W. By June the SW. monsoon is fully established over the whole region and blows strongly, especially in the west where its average force is 6, rising to 7 or more to the east of Socotra and reaching force 8 on about half the days of the month in July. Squalls are frequent, especially where the monsoon is strong, and there is heavy swell. The monsoon continues strong until September, when it begins to weaken, and in October winds are light and variable with frequent calms. Near the equator the monsoons blow less strongly and for a shorter period.

Cyclonic storms are liable to occur in the transition periods of late April to June and September to December, but they have never been recorded in this region in other months of the year. They are infrequent and are not experienced every year but when they do occur they may be severe. They approach from the eastern Arabian sea and usually travel towards the west or west-north-west. They rarely if ever travel south of 10° N. and hence do not affect the African coast. They are felt occasionally on the Arabian coast though they often lose their intensity and die away near the Khorya Morya islands.

The following description of a day's weather in the central Arabian sea during the NE. monsoon gives a more vivid idea of the conditions in that season than can be gained from average values. The ship was to the east of the area dealt with in this Part, but the description is probably typical of a fairly wide region.

*February 25, 1935.* Position at 0800: 10° 42' N., 64° 36' E. (about half way between Ceylon and Aden).—At about 0400 broken cumulus was passing over the starlit sky; but towards 0700 patches of altocumulus covered about 3 tenths of the sky and at 0800 a few fine cirrus threads became visible. A light N. wind, which with temporary deviations to NE, had been blowing with surprising uniformity for some days, was force 3 at 0400 and 0800. At 0800 temperature was 78° F., humidity 75 per cent.; it was a fine summer morning of tonic freshness.

About 1000 a few isolated fine-weather cumulus appeared, coalescing in places into small stratocumulus; the amount remained small, varying from hour to hour. Cirrus clouds on the other hand increased, spreading in from the south. They dissipated again by sunset. Air temperature decreased very slowly during the day as the ship travelled WNW., and remained about 3° F. lower than the sea temperature.

Visibility was very good throughout the day and was so exceptional in the evening that the sun sank in a grey-green horizon with no trace of yellow until some time after sunset.

About 2000 small fine-weather cumulus covered about one tenth of the sky. Temperature was 76° F., about 2° F. lower than in the morning and humidity 68 per cent. Zodiacal light was clearly visible in the west until 2100. (Bibliography No. 24.)

#### Italian Somaliland

On the Indian ocean coast of Italian Somaliland the weather is hot and sunny over the greater part of the year, but is said to be not

unhealthy. The average annual temperature is about 80° F. or rather more and ranges some 6° or 7° F. above and below that value during the course of the day. The average monthly temperatures vary only 2° or 3° F. from the annual mean, June to September is the coolest time of the year and the intermonsoon periods, known as Tangam-bili, are said to be the hottest. Temperature rarely rises above 100° F. In the interior the climate is much more extreme, average temperature is several degrees higher than on the coast, the daily range is about 25-30° F., and temperatures exceeding 120° F. have been recorded. On the coast the relative humidity is high, averaging 80-90 per cent. as the mean of the day during most of the year and often rising to 90 or 95 per cent.; inland the air is drier, humidity falling to less than 80 per cent. and at Lugh Ferrandi to less than 50 per cent.

The rainfall is low, though greater than in the Gulf of Aden, the annual fall being for the most part between 350 and 625 mm. (14 and 25 in.). On the coast the rain occurs chiefly between the monsoons or in their early stages. The rainiest period is from April or May to June or July; there is a decrease in August and September followed by a slight increase in October and November. January to March is almost completely dry. In the interior the decrease in August and September becomes more marked and there are two almost rainless seasons, one from January to March, coinciding with that on the coast, and the other from June to September; the rain falls chiefly in April-May and October-November. In most parts the second of these periods is the rainier but in some parts more rain falls in April and May. In general the average fall in the wettest months is about 100-125 mm. (4-5 in.).

The amount of cloud is small in all seasons and decreases towards the north. The cloudiest period, with an average of 4-5 tenths of sky covered, is during the SW. monsoon. There appears to be very little difference between the coast and the interior. Mist and fog are also frequent during the SW. monsoon as far as about 200 miles off shore and may occur as early as March. They are rare from November to February and infrequent in October. Flying is said to be possible at all times, but during the SW. monsoon, when visibility is poor, the horizon is generally misty and it may be necessary to fly low.

From December to March winds are chiefly NE. or E. blowing most steadily in January. In April and May winds are light and their direction becomes more variable; inland there are frequent calms, particularly between midnight and dawn. With the arrival of the monsoon SW. winds gain predominance and blow persistently in July and August, becoming less steady in September. In October and November winds are variable with NE. increasing in frequency.

#### II—PRESSURE

Charts of average isobars over the Indian ocean in representative months of the different seasons are reproduced in Volume I. They show that in the region covered by this Part there is a complete reversal of pressure gradient during the course of the year.

From November to March there is a continuous gradient from north to south, with a high pressure over the Asiatic continent and a low over

the equatorial belt. The isobars run roughly from west-south-west to east-north-east in the early part of the season and from west to east in the latter part, the gradient being steepest in January. In April the distribution becomes very irregular with no well marked pressure differences. By May the isobars again run from west to east but the gradient is reversed compared with the winter months; there is low pressure over northern India from which the pressure rises continuously to the high near the southern tropic. Over the Gulf of Aden the direction of the isobars is from about west-south-west to east-north-east roughly parallel with the Gulf, whereas further south the isobars run from west to east or even west-north-west to east-south-east. The gradient is steep from June to August and then slackens. In October the Gulf of Aden lies in a col with high pressure to north and south and low to east and west.

**Annual variation**

Values of the normal monthly pressure at mean sea level are included in the general climatological tables for Aden, Perim and Berbera; values based on a few months' data are given also for recently established stations. Data for places in Italian Somaliland appear to be unreliable and are not included. In conformity with the distribution of pressure described above the pressure in the Gulf shows a regular annual variation from a maximum of about 1016 mb. in December to a minimum of 1004 mb. in July. Near the equator the variation is reversed with a minimum in December and a maximum in July-August. In this latter region the variation is much less regular and the range is only about one third that in the Gulf, namely from about 1014 mb. to 1010 mb. Between the two, in about 5° N., the range is probably even lower, amounting to only 2 or 3 mb.

The extreme range of pressure in any month is not large compared with temperate latitudes. At Berbera the average highest and lowest pressures recorded at 0800 in each month during the period 1924-34 are shown in the following table:—

AVERAGE HIGHEST AND LOWEST PRESSURES AT MEAN SEA LEVEL

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
<i>millibars</i>													
BERBERA													
Highest ..	1019	1018	1017	1014	1013	1009	1008	1008	1011	1016	1017	1019	1020
Lowest ..	1014	1012	1010	1008	1005	1002	1002	1002	1004	1008	1012	1013	1001
Range ..	5	6	6	6	7	7	6	6	7	7	5	6	19

Authority.—Bibliography No. 94.

Period.—1924-34.

Time of observation.—0800 (Z-3).

Owing to the omission of decimal points the range in some months differs by 1 mb. from the difference between the highest and lowest pressures shown in the table.

Average values of highest and lowest pressure at 1400 would be some 3 mb. lower.

During the same period the absolute extremes recorded, taking into account all three hours of observation, were 1020.6 and 991.1, giving an extreme range of 29.5 mb. At Aden in the period 1891-1910 the corresponding figures were 1022 and 997 mb.

**Diurnal variation**

The regular diurnal variation of pressure is large. Judging from ships' observations distributed over the whole width of the North Indian ocean the difference between the average highest and lowest hourly values is between 2½ and 3 mb. The pressure shows a regular oscillation with two maxima and two minima during the course of the day. The amounts by which the mean hourly values at the times of maximum and minimum differ from the daily mean are shown in the following table:—

Lat. N.	Season	Principal				Secondary			
		Max.		Min.		Max.		Min.	
10-20°	Nov.-Apr. ..	mb.	time	mb.	time	mb.	time	mb.	time
	May-Oct. ..	1.7	10	-1.4	16	0.6	22	-0.9	03-04
	Year ..	1.3	10	-1.3	16-17	0.6	22-23	-0.6	04
0-10°	Nov.-Apr. ..	1.4	10	-1.3	16-17	0.6	22-23	-0.7	03-04
	May-Oct. ..	1.5	10	-1.6	16	1.0	22-23	-0.9	04
	Year ..	1.3	10	-1.5	16	1.0	22	-0.7	04
		1.4	10	-1.5	16	1.0	22	-0.9	04

Authority.—Bibliography No. 5 (December).

At coastal stations in the Gulf the range is even higher. Hourly values are not available but average values of pressure at the synoptic hours 0600 and 1200 G.M.T. (approximately 0900 and 1500 local time) show a difference of 3½ mb. over the greater part of the year and of more than 4 mb. in some months. These values probably slightly underestimate the true daily range. The seasonal variation is irregular.

A recent investigation at Aden indicates that the tendencies at the synoptic hours to be expected from the normal diurnal variation are:—

G.M.T.	0000	0600	1200	1800
<i>millibars</i>				
February .. ..	-1.0	+1.6	-2.1	+1.5
May .. ..	-0.9	+1.7	-2.3	+1.7
August .. ..	-0.5	+1.5	-2.4	+1.3
November .. ..	-1.0	+1.5	-1.9	+1.6

The figures are based on values for only a small number of days so that their absolute accuracy cannot be guaranteed.

Owing to the exceptional character of the diurnal variation of wind in the Gulf of Aden during the SW. monsoon (see pages 50-5) the diurnal variation of pressure in that season is of particular interest. Data for two sea areas, one in the Gulf and one in the Arabian sea, are therefore given in the table below. The figures show that, compared with the Arabian sea farther east, pressure in the Gulf is abnormally high about noon and abnormally low about midnight.

DIURNAL VARIATION OF PRESSURE, JULY-AUGUST  
(departures from mean)

Area	0400	0800	1200	1600	2000	2400
<i>millibars</i>						
12-13° N.						
46-48° E. .. ..	-0.8	+1.4	+1.4	-1.1	-0.4	-0.5
55-60° E. .. ..	-0.5	+1.0	+0.6	-1.6	+0.2	+0.3

Authority.—Bibliography No. 58.